

wherein each focusing lenslet in said first microlens array focuses a reduced-size image of the light emitting source of an LED in said LED array, towards a focal point above said ~~focusing-type~~ second microlens array;

wherein each collimating lenslet in said second microlens array collimates the light rays associated with the reduced size image of the corresponding light emitting source; and

wherein each cylindrical lenslet diverges the collimated light beam so as to produce a ~~spatially-coherent~~ spatially-incoherent planar light illumination beam (PLIB) component, which collectively produce a composite PLIB from the LED-based PLIM.

Claim 264 (currently amended): An LED-based PLIM chip for use in a PLIIM-based system having a relatively short working distance, comprising: a ~~linear-type~~ light emitting diode (LED) array (A), a ~~focusing-type~~ first microlens array (B), ~~collimating-type~~ a second microlens array (C), and a ~~cylindrical-type~~ third microlens array (D), wherein each are said array is mounted within ~~the~~ an IC package of the PLIM chip, for use in object illumination producing a spatially-incoherent planar light illumination beam (PLIB) therefrom.

Claim 265 (currently amended): An optical process carried out within ~~the~~ an LED-based PLIM, wherein (1) ~~the~~ a focusing lens element focuses a reduced-size image of ~~the~~ a light emitting source of ~~the~~ a LED towards a focal point within ~~the~~ a barrel structure, (2) ~~the~~ a collimating lens element collimates the light rays associated with the reduced-size image of ~~the~~ said light emitting source, and (3) ~~the~~ a cylindrical lens element diverges (~~i.e. spreads~~) the collimated light beam so as to produce a spatially-incoherent planar light illumination beam (PLIB).

Claim 266. An optical process carried out within ~~the~~ an LED-based PLIM, wherein (1) each focusing lenslet in a focusing lenslet array focuses a reduced-size image of a light emitting source of an LED towards a focal point above ~~the focusing-type~~ a collimating microlens array, (2) each collimating lenslet in said collimating lenslet array collimates the light rays associated with the reduced-size image of the light emitting source, and (3) each cylindrical lenslet in a cylindrical lenslet array diverges the collimated light beam so as to produce a spatially-incoherent planar light illumination beam (PLIB) component, which collectively produce a composite spatially-incoherent PLIB from the LED-based PLIM.

Claim 267. A LED-based PLIM is realized as an array of components, contained within a miniature IC package, namely:

a ~~linear-type~~ light emitting diode (LED) array, on a semiconductor substrate, providing a linear array of light emitting sources (~~having~~ having the narrowest size and dimension ~~possible~~) possible;

a ~~focusing-type~~ first microlens array, mounted above and in spatial registration with the LED array, providing a ~~focusing-type~~ focusing lenslet above and in registration with each light emitting source, and projecting a reduced image of the light emitting source at its focal point above the LED array;

a ~~collimating-type~~ second microlens array, mounted above and in spatial registration with the ~~focusing-type~~ first microlens array, providing each focusing lenslet with a ~~collimating-type~~ collimating lenslet for collimating the light rays associated with the reduced image of each light emitting device;

a ~~cylindrical-type~~ third microlens array, mounted above and in spatial registration with the ~~collimating-type~~ micro-lens second microlens array, providing each collimating lenslet with a linear-diverging type lenslet for producing a spatially-incoherent planar light illumination beam (PLIB) component from each light emitting source; and

an IC package containing the above-described components in the stacked order described above, and having a light transmission window through which the spatially-incoherent PLIB is transmitted towards ~~the~~ a target object being illuminated.

Claim 268 (currently amended): A LED-based PLIM realized within an IC package design comprising:

a light emitting diode (LED) providing a light emitting source (having the narrowest size and dimension possible) on a semiconductor substrate;

a focusing lenslet, mounted above and in spatial registration with the light emitting source, for projecting a reduced image of the light emitting source at its focal point, which is preferably set by the further working distance required by the application at hand;

a ~~cylindrical type microlens~~ cylindrical lenslet, mounted above and in spatial registration with the ~~collimating type microlens~~ a collimating lenslet, for producing a spatially-incoherent planar light illumination beam (PLIB) from the light emitting source; and

an IC package containing the above-described components in the stacked order described above, and having a light transmission window through which the composite spatially-incoherent PLIB is transmitted towards the target object being illuminated.